

CHAPTER 17

SEEDING

Introduction Often when seeding is discussed one might think that it is simple and of little value. But the seeding operation is of the utmost importance because of the variables within the seeding operations. Questions like:

What type of seeding?
What type of seed?
What must be done first?
When should seeding be done?

must be answered before this work is started.

Seeding is often considered a beautification process. Often because of this concept it is the last item of the project to be completed. But beautification is the secondary purpose for seeding. The primary purpose of seeding is erosion control. Therefore sections of bare earth and the length of their exposure to erosion should be minimized. This is done by scheduling seeding and sodding operations as early as possible. Stage seeding should be done if at all possible. Large cut and fill slopes should be seeded as soon as they are finished. Taking time to consider seeding operations is taking time to consider reducing soil erosion. Seeding for the prevention of soil erosion is not only one of the major items in road construction, but is also an important maintenance factor.

The Certified Technician must give rigid inspection to all seeding operations to insure:

- * correct quantities
- * proper mixing of seed
- * correctly prepared seed bed

The technician should also obtain enough information to make reports correctly.

This section will prepare the Certified Technician for seeding operations. It will also answer the questions noted earlier.

Types	<p>When seeding is discussed the technician must not confuse the type of seeding with the type of seed mixture, a material. The two should be etched clearly in the mind of the technician.</p> <p>There are two types of seeding:</p> <ul style="list-style-type: none"> * Plain seeding * Mulched seeding <p>The only difference between plain seeding and mulched seeding is that mulching material is placed on the areas where it is necessary. In other words, the amount of seed and fertilizer and method of preparation and placement for the two kinds are the same. Plain seeding is seldom used.</p>
Preparation	<p>Prior to the placement of seed the soil must be prepared. The preparation allows the seed to readily attach it's root system to the soil. A seed may sprout laying on a large rock but will not continue to grow without a root system. The area to be seeded should be:</p> <ul style="list-style-type: none"> * in accordance with the required cross section and finished grade. * made smooth and uniform. * loosened to a minimum depth of 3 inches. * covered with top soil if required.
Application Rate of Fertilizer	<p>After the soil is prepared, fertilizer is spread uniformly over the area at the rate of 800 pounds per acre. Fertilizer applied with hydro-seeders should be done so with a minimum of 500 gallons of water per acre. This yields a visual means of inspection for an even distribution. It also insures a dampening effect which begins the release of the fertilizer chemicals into the soil.</p> <p>Some contractors and subcontractors may experience difficulty in obtaining the specified 12-12-12 fertilizer and may request substitutes. These substitutes may be approved by the Engineer of Construction upon written request. The substitute must contain balanced ingredients such as 10-10-10. The application rate, however, must be adjusted to compensate for this change. All fertilizer will be based on the 800 pound per acre for seeding and 400 pounds per acre under sod.</p>

Application Rate of Fertilizer (cont'd)	<p>A change from 12-12-12 to 10-10-10 would mean the application of 12/10 x 800 or 960 pounds per acre. But only 800 pounds would be paid for. Accurate records must be maintained of all the fertilizer used and recorded in the contract and project records. The computations converting the total actual quantity used to equivalent tons of 12-12-12 must be shown in the final construction record.</p>
Application of Seed	<p>Seed may be drilled into the ground. If drilled the seed should not be covered more than 1/2 of an inch. The seed may also be mixed with water and sprayed over the area to be seeded. This is referred to as hydro-seeding. Hydro-seeding allows the contractor to reach areas often inaccessible with seed drilling devices. Even still, there may be other inaccessible small areas. These may be seeded with a hand operated cyclone seeder. The cyclone seeder may also be used where the area to be seeded is small. For example; seeding around new luminaire bases when the balance of the area is already established.</p> <p>The Standard Specifications state, "leguminous seeds, unless otherwise specified, shall be inoculated with a culture." That statement may create some questions in the technician's mind.</p> <p>What are leguminous seeds? These are seeds that belong to the pea plant family. Such legumes as peas, beans, and peanuts are valuable foods. However they do not make good roadway vegetation. But alfalfa, clover and vetch do. Their purpose are two fold:</p> <ul style="list-style-type: none"> * Their massive root system helps prevent future erosion of embankments. * Their biological activity is also important. * Taking nitrogen from the air and changing it into forms that can be used by other plants. <p>The culture is a nitrogen fixing bacteria that enhances the germination of the seed. The culture (inoculant) should be mixed with sufficient water to distribute it thoroughly. The seed should be wetted thoroughly with the solution. Once the inoculation is complete the seed should be allowed to dry sufficiently. The inoculated seed shall be sown within 30 hours after the treatment. Often the legumous seeds are hydraulic applied. If so the inoculant may be added to the water in the spray tank. The amount of inoculant should be 2 times the manufacturer's recommendations. Inoculant should not be used if more than one year old.</p>

Application
of Seed
(cont'd)

Seeding is usually indicated by a "Seed Mixture Type". A project may have several different types of seed mixtures. Thus it is imperative that the Certified Technician know:

- * where are the different mixtures to be placed.
- * what type of seed mixtures are to be used.
- * the proposed rate of application of each mixture.

The type is normally only indicated in the Proposal quantity items. But occasionally, it will be found on the plans if differing types are to be used. INDOT uses eight types of seed mixtures. They are:

- * Seed Mixture "R"
- * Seed Mixture "U"
- * Seed Mixture "P"
- * Seed Mixture "CV"
- * Seed Mixture "Legume"
- * Seed Mixture "D"
- * Seed Mixture "T"
- * Seed Mixture "Grass"

The letter notation (R,U,P,CV,D,T) indicates the general area where the seed is to be placed. The rate of application and a brief explanation of each will be given.

Seed mixture "R" is a general purpose seed mixture. It will normally be placed in rural areas. The application rate for mixture "R" is 170 pounds per acre. The mixture consists of the following grasses:

- * 95 # of Kentucky 31 Fescue or approved equal
- * 65 # of Perennial Ryegrass
- * 10 # of Jasper Red Fescue or approved equal

Seed mixture "U" is applied at specific locations. Normally these locations are in urban areas. Its application rate is 150 pounds per acre. The mixture consist of the following grasses:

- * 95 # of a 4-way blend of turf type tall fescue
- * 20 # of Jasper Red Fescue or approved equal
- * 35 # Certified fine balded perennial ryegrass. Such ryegrass as Regal, Fiesta, Blazer, or approved equal.

Application
Rate of
Seed(cont'd)

The application rate for Mixture "P" is 80 pounds per acre. It consists of the following grasses:

- * 20 # of Perennial Ryegrass
- * 30 # "Fulfs" Puccinella Distans
- * 30 # Jasper Red Fescue

Seed mixture "CV" consists of Crown Vetch. It is placed at the rate of 10 pounds per acre. Crown Vetch should be placed at the following locations:

- * All slopes 3 to 1 or steeper
- * On granular slopes
- * On slopes highly susceptible to erosion

Because of the premium price of crown vetch seeding it should be:

- * used only on selected areas and slopes.
- * sown with a hand type spreader.
- * placed just prior to placing specified seed mixture.

Seed mixture legume is placed at specific locations. Those locations may be noted on the plans. Normally legumes are planted on the original ground behind the backslope. There are two types of legume seed mixture:

- * Type 1 is placed at the rate of 190 pounds per acre and shall consist of:
 - * 10 # of Sericea Lespedeza or Korean Lespedeza
 - * 10 # of medium Red Clover or Alsike Clover
 - * the mixture specified for Seed Mixture R.
- * Type 2 is placed at the rate of 110 pound per acre and shall consist of:
 - * 10 # of Sericea Lespedeza or Korean Lespedeza
 - * 10 # of medium Red Clover or Alsike Clover
 - * 10 # of Birdsfoot Trefoil
 - * 40 # of Certified Common Kentucky Bluegrass
 - * 30 # of Creeping Red Fescue
 - * 10 # of Annual Ryegrass

There are a number of other seed mixtures used in special situations such as ditches with chronic saturated soils and temporary cover for disturbed soil. These include Seed Mixture D; Seed Mixture T, Spring Mix and Fall Mix; and Seed Mixture Grass, Types 1 and 2. The technician can refer to Section 621.06 (e), (f), and (g) for the mixtures.

Seasonal
Limitations

The Contractor shall post a warranty bond for all permanent seeding done from October 16 through January 31. Only completed seeding with seed mixtures R, U, or P shall satisfy

Seasonal
Limitations
(cont'd)

the requirements of the warranty bond. Seeding without mulch shall not be done between May 1 and August 15.

Mulching

The next step in the process of seeding, if required, is the placement of a mulching material. Often when mulch is talked of many automatically think of straw. But straw is only one of several mulches allowed by INDOT.

Mulch for seeding may consist of:

- * Straw
- * Excelsior mulch
- * Excelsior blankets
- * Paper Mat
- * Straw Mat
- * Wood Cellulose Fiber Mulch

Because straw and wood cellulose fiber mulch are the most commonly used, the manufactured mats will not be discussed further. It is recommended that the trainee study the information on these products. It can be found in the Standard Specifications Sections 621.05(d),(e),(f) and 914.05(a).

Excelsior mulch is wood fibers cut from sound green timber. The fibers should have an average length of 4 to 6 inches. The cut should be at a slight angle to the natural grain. This causes the fibers to splinter. The splintering in turn provides adherence in the fibers and to the soil during weathering.

Wood cellulose fiber mulch is made from wood chip particles. These particles are manufactured such that they can be discharged uniformly. The placement is done by a hydraulic water sprayer. It is important that the sprayer can agitate properly. The agitation keeps the material suspended in the water, thus yielding a uniform cover. The wood cellulose mulch fibers intertwine physically to form a strong moisture holding mat on the ground surface. The wood cellulose mulch shall be placed at a rate of 1 ton/acre within 24 hours after seeding.

Placement

Mulching material is to be applied uniformly in a continuous blanket at the rate of 2 tons per acre. It is important to determine that the required amount of mulching material is placed. Too much mulch is not only wasteful, but will retard the growth of the vegetation. Too little mulch will not afford sufficient protective cover for the seed. Mulch shall be placed within 24 hours after seeding. The percent of moisture in the mulch shall be determined in accordance with 621.13(c).

Adequate provision for holding the mulching material in place is important. Unless the mulching material is retained, winds or traffic blasts adjacent to the

Placment
(cont'd)

pavement may displace it. Several approved methods give satisfactory results. They are:

- * Punching
- * Method A
- * Method B
- * Method C
- * Method D
- * Method E

The most common method used is punching. The punching operation should partially cover the mulch with soil. The tool used for the punching shall have

- * disks that are notched
- * disks with 16" minimum diameters
- * disks that are flat or uncupped
- * disks spaced a maximum of 8" apart along the axle
- * disks performing longitudinally with the mulch tiller
- * axle sections not exceeding 8 feet in length
- * the capabilities to have weight added or hydraulic force pushing the disks into the ground

Methods A, B, C, D, and E, will be permitted on slopes steeper than 3 to 1. These methods may also be specified by the contract proposal or the PE/PS.

Method A

The mulch may be held in place by use of a mulch binder which is in accordance with all applicable State and Federal regulations and applied according to the manufacturer's instructions. The product should contain a coverage indicator to aid in visual inspection for evenness of application. If the mulch fails to stay in place, the Contractor must repair all damaged areas.

Method B

In Method B the mulch is held in place by spraying it with a satisfactory liquid asphalt or asphalt emulsion. This bituminous material:

- * may be applied immediately after the mulch is placed or
- * may be injected into the mulch as it leaves a power driven mulch spreader.

If applied to the mulch surface, the bituminous should be applied at a rate of approximately 0.06 gallon per square yard. If applied with the mulch through the spreader, the rate is to be approximately 60 gallons per 1 ton of mulch. The exact amount shall be as directed.

Method C

Method C utilizes binder twine and wooden pegs to hold the mulch in place. The pegs must be not less than 6 inches and spaced 4 feet apart. The twine should be

Method C (cont'd)	placed parallel to the pavement. Additional twine will be placed at 60 degrees with the pavement edge in both directions. The diagonal strands should be spaced 12 feet center to center along the parallel strands. The next parallel strand is spaced at the intersections of the diagonal strands. This intersection is 12 feet from the previous parallel strand intersection measured along the diagonal strand. The following detail will be helpful in understanding Method C.
Method D	<p>The mulch may be held in place with a polymeric plastic net. during placement the net should:</p> <ul style="list-style-type: none"> * be unrolled such that it lays out flat, evenly and smooth. * not be stretched. * be held in place by wire staples, spaced 4 feet apart with alternating spacing. * be secured at top and bottom of the slope with staples one foot on centers. * be overlapped 4" and stapled on the ends and edges. * be placed with the material length running from top of slope to toe of slope OR the length running horizontally or parallel to the contour. * be stapled 1' on center along overlaps parallel to the slope. * be stapled 3' on center along overlaps perpendicular to the slope.
Method E	The area may be covered with erosion control blankets. The Contractor will be permitted to use excelsior blanket, paper mat or straw mat where mulched seeding or erosion control blanket is specified. Wood cellulose fiber mulch may be used where mulched seeding is specified. See Section 621.05 for specifications on applying fertilizer, seed and mulch.
Acceptance of Materials	<p>The operation of seeding has some ingredients that require rigid inspection. Other ingredients require very little inspection. First consider grass seeds. Grass seed should be received:</p> <ul style="list-style-type: none"> * bagged proportionatly. (i.e. seed mixture "R" should come in 42.5# bags. Four bags will complete one acre. Seed mixture "U" should come in 50# bags. Three bags will complete one acre.) * fully tagged. The technician should learn to spot this tag. It contains vital information. The tags should show: <ul style="list-style-type: none"> * Mix composition. Which should match the specifications. * Source of supply. The source of supply should have been sampled, tested, and reported by the State Seed Commission. * An expiration date. Do not use the seed beyond the expiration date.

Acceptance
of Materials
(cont'd)

- * A Laboratory number which is used on the material record.

The acceptance of mulch is dependent upon the mulch being used. The following mulches are accepted visually and with a Type C Certification:

- * Wood Cellulose fiber
- * Excelsior blankets
- * Paper mats
- * Straw mats

All other types of mulching materials are accepted visually.

All mulches are to meet moisture requirements. Therefore moisture tests are required. One test is required for each 20 tons of mulch. Additional tests may be required if visual inspection indicates a significant amount of moisture in the mulch. The results of this test are recorded on TD 647. A copy can be found in the appendix.

Fertilizer standards are governed by the rulings of the Indiana State Seed Commission. The Certified Technician need only to be concerned about the analysis of the fertilizer. If fertilizer is bagged, the bag should contain the analysis of 12-12-12. Remember the contractor can use a different analysis with adjustments to the application rates. The bag should still contain the analysis (example 10-10-10; 8-8-8, etc.). If the fertilizer is received in bulk or liquid form a Type C Certification is the basis for acceptance. A visual inspection should be made of bulk material to assure that it has never been extremely wet. This can be detected by many large discolored clumps.

Measurement
of Quantities

The measurement and payment of seeding items are dependent entirely on the contract proposal. The proposal will outline separate items for seeding or only one item for Mulched Seeding, "Class____", "Type____".

If seeding is to be paid by separate bid items the units will normally be as follows:

- | | |
|---|-------|
| * Seed Mixture, "Class____", "Type____" | Pound |
| * Fertilizer | Ton |
| * Mulching Material | Ton |

If seeding is to be paid for by separate bid items, it is the duty of the Certified Technician to see that seed is weighed each day and proper reports made. It will be permissible to count sacks of fertilizer used each day then multiply by the weight of one sack to get the daily record of fertilizer. Remember that the price of sodding includes fertilizer and this item

Measurement of Quantities (cont'd) used in sodding is not paid for separately. It is best to keep accurate records of all fertilizer delivered to the project, then deduct the amount of fertilizer used in sodding to determine the correct pay quantity for fertilizer used for seeding. The amount of fertilizer used in sodding can easily be determined by multiplying the acres of sod by the specified amount of fertilizer per acre.

Mulching material is paid for by the ton, so each truck load must be weighed and a weigh ticket made. Representative samples must be taken from the mulching material to determine the amount of moisture in the material. This sample is to be weighed at time of delivery, then re-weighted when the mulching material is dry, to determine the moisture content. To determine moisture, this sample is placed in a large burlap sack, then placed in a suitable location to dry. The number of samples required will depend on the total amount of mulching required, weather conditions and sources of supply. Moisture content is determined using the formula under Section 621.13(c).

If the contract proposal has an item of "mulched seeding", then measurement and payment is different. The item "mulched seeding" includes all ingredients needed to complete the seeding operation. (i.e. it includes the seed, fertilizer, and mulching material.) Mulched seeding is measured and paid for by the square yard.